



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

|  |             |                         |                     |                  |
|--|-------------|-------------------------|---------------------|------------------|
| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR    | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
| 09/642,061   | 08/18/2000  | Blake Lewis             | 103.1035.01         | 6742             |
| 22883  | 7590        | 03/23/2004              | EXAMINER            |                  |
| SWERNOFSKY LAW GROUP PC<br>P.O. BOX 390013<br>MOUNTAIN VIEW, CA 94039-0013 |             |                         | LE, MIRANDA         |                  |
| ART UNIT   |             | PAPER NUMBER            |                     | 19               |
| 2177   |             | DATE MAILED: 03/23/2004 |                     |                  |

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                        |                  |
|------------------------------|------------------------|------------------|
| <b>Office Action Summary</b> | Application No.        | Applicant(s)     |
|                              | 09/642,061             | LEWIS ET AL.     |
|                              | Examiner<br>Miranda Le | Art Unit<br>2177 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 22 January 2004.
- 2a) This action is FINAL.                                   2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-8 and 24-45 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-8 and 24-45 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
  1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

|   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                    | Paper No(s)/Mail Date: _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date: _____ | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|   | 6) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION**

1. This communication is responsive to Amendment D, filed 1/22/2004.
2. Claims 1-8, 24-45 are pending in this application. Claims 1, 26, 36 are independent claims. In the Amendment D, no claim has been added, cancelled, and amended. This action is made Final.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-3, 5, 8, 24-28, 30, 33-38, 40, 43-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rungta et al. (US Patent No. 6,484,186 B1), in view of Kuster et al. (US Patent No. 6,473,775).

**As to claims 1, 26, 36,** Rungta teaches “a method of capturing the contents of files and directories in a file system, said file system comprising a set of storage blocks in a mass storage

system including steps of recording an active map in said file system of said storage blocks used by said active file system" at col. 2, lines 18-66, col. 2, lines 40-65, col. 3, lines 18-33;

"recording a consistency point in said file system including a consistent version of said file system at a previous time, said consistency point including a copy of said active map at said previous time" at col. 3, lines 18-33, col. 4, lines ;

"at least one said copy of said active map included in said consistency point" at col. 4, lines 1-15, col. 4, lines 51-64.

Rungta does not expressly teach "refraining from writing data to storage blocks in response to said active map". However, Kuster teaches this limitation at col. 8, lines 36-47, col. 8, lines 58-64.

Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Rungta with the teachings of Kuster to include "refraining from writing data to storage blocks in response to said active map" in order to provide a system and method for creating a snapshot with a differential file maintained on the base volume that can grow as much as needed.

**As to claims 2, 27, 37,** Rungta teaches "said step of refraining includes determining a logical union of said storage blocks used by one or more of said copies of said active map included in said consistency point" at col. 2, lines 40-54, col. 3, lines 18-33, Fig. 4.

**As to claims 3, 28, 38,** Rungta teaches “said step of refraining includes determining a subset of said storage blocks used by one or more of said copies of said active map included in said consistency point” at col. 4, lines 51-64, col. 4, lines 1-15, Fig. 4.

**As to claims 5, 30, 40,** Rungta teaches “said active map included in said consistency point is a snapmap” at col. 3, lines 18-33.

**As to claims 8, 33, 43,** Kuster teaches “steps of copying modified data to a new block and saving old data in a current data block so as to implement a copy-on-write mechanism” at col. 9, line 1 to col. 10, line 47, col. 8, lines 7-18, col. 8, lines 65-67.

**As to claims 24, 34, 44,** Kuster teaches “the step of generating a summary map responsive to at least one said copy of said active map included in said consistency point” at col. 8, line 65 to col. 9, line 20.

**As to claims 25, 35, 45,** Kuster teaches “step of refraining from writing data to said storage blocks is accomplished by being responsive to said summary map” at col. 8, line 65 to col. 9, line 20.

5. Claims 4, 6-7, 29, 31-32, 39, 41-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rungta et al. (US Patent No. 6,484,186 B1), in view of Kuster et al. (US Patent No. 6,473,775), and further in view of Hitz et al. (US Patent No. 5,819,292).

**As to claims 4, 29, 39,** Rungta, Kuster does not specifically teach “file system is a WAFL file system”. However, Hitz teaches this limitation at col. 5, lines 48-59, col. 8, lines 16-39, col. 11, lines 6-27.

Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Rungta, Kuster with the teachings of Hitz to include “file system is a WAFL file system” in order to provide a method for maintaining a file system in a consistent state wherein WAFL always write new data to unallocated blocks on disk.

**As to claims 6, 31, 41,** Rungta, Kuster does not explicitly teach “the step of removing a root inode of said snapmap using a snap delete”. However, Hitz teaches this limitation at col. 7, lines 1-27, col. 13, lines 2-24, col. 10, lines 18-56.

Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Rungta, Kuster with the teachings of Hitz to include “the step of removing a root inode of said snapmap using a snap delete” in order to provide a method for maintaining consistent state of a file system.

**As to claims 7, 32, 42,** Rungta teaches “steps of determining not to write to a block after said step of removing, provided a previous or next snapmap uses said block” at col. 4, lines 1-15, col. 4, lines 51-64.

Hitz teaches this limitation at col. 4, lines 18-20, col. 11, lines 29-39.

***Response to Arguments***

6. Applicant's arguments filed 03/10/2003 have been fully considered but they are not persuasive.

Applicant argues that:

Claim 1 is not obvious in view of Rungta and Kuster.

The Examiner respectfully disagrees for the following reasons:

Rungta teaches the step of "recording an active map in said file system of said storage blocks used by said active file system" as "the file includes metadata 215 (data about the file). Metadata 215 specifically includes a file map 220 that maps the logical order of the block comprising the file to the physical blocked stored on disk 230" (col. 2, lines 39-44).

Rungta teaches the step of "recording a consistency point in said file system including a consistent version of said file system at a previous time, said consistency point including a copy of said active map at said previous time" as "The original contents can be found by accessing the correspond logical block from snapshot file map 420" (col. 3, lines 31-33), and "When a bit of bitmap is set, it indicates that the contents of the corresponding logical block have changed from the last consistent version of the file" (col. 3, lines 28-30). It should be noted that the copy of said active map at said previous time corresponds to "snapshot metadata retains the copy of the original metadata of the file" (col. 3, lines 26-28).

Note that Rungta also teaches the consistency point including the active map at said previous time at col. 4, lines 13-15, that is, at step 625 the file map system uses the original file map to access the physical block corresponding to the next logical block. And, the consistent

version is archived (col. 4, lines 19-20), “the file system reads the snapshot metadata for the archive tool, as snapshot metadata 428 is the metadata of the file when the file was last in a consistent state” (col. 4, lines 36-39).

It is brought to Applicant’s attention that not only does Rungta teaches snapshot is created when the files are opened for writing (col. 2, line 66 to col. 3, line 12), but also Rungta teaches snapshot can be used to archive the file (col. 4, lines 24-25). Rungta teaches the step of creating a snapshot including the consistency point at col. 3, lines 13-33. More specifically, when creating a snapshot, Rungta teaches copying of the metadata of the file into snapshot metadata, and the metadata could be changed but the snapshot metadata retains a copy of the original metadata file (i.e. consistent point) (col. 3, lines 25-33, col.8, lines 52-54). Also, a bitmap is initialized (i.e. recording) to indicate that all physical blocks pointed to by the original file map are still unchanged (col. 3, lines 8-10), it should be understood that the consistent version of said file system at previous time corresponds to the original file map (i.e. original version).

Rungta teaches “at least one said copy of said active map included in said consistency point” at col. 3, lines 25-27, that is, “after metadata 228 has been copied to snapshot metadata 428, metadata 228 can change, while snapshot metadata 428 retain a copy of the original metadata of the file (i.e. consistency point)”.

It should be noted that according to the specification, “a bitmap (henceforth the “active map”) describes which blocks are free and which are in use by the active file system (page 5, line 1-3), similarly, as shown in Fig. 7, Rungta discloses “a method for releasing resources used by

snapshot" (col. 4, lines 51-64), "this release includes the duplicate metadata and all duplicated physical blocks" (col. 4, lines 62-64). This operation is based on the snapshot and bit map (i.e. active map), wherein the corresponding bits in the bit map indicates the blocks status of the file system (col. 4, lines 24-39).

Moreover, Rungta discloses snapshot is retained as the file may not be consistent (i.e. archiving file is retained), (col. 4, lines 54-58), and depends on the snapshot and bitmap status (col. 4, lines 24-39). It should be noted archiving a file corresponds to writing data to storage block (i.e. archiving a file by archiving every block) (col. 4, lines 4-9).

Furthermore, Rungta discloses if the step of creating the snapshot for writing could not be performed (i.e. file system could not be reached a consistent state), then the file is not open for writing and is currently in a consistent state (col. 4, lines 3-6). And, the step of writing could not be performed until the snapshot is completely created (i.e. the consistency point reaches a consistent state), at this time the metadata of the previous file has been copied into the snapshot metadata (col. 3, lines 24-28). Note that the snapshot metadata is the metadata of the file when the file was last in a consistent state (col. 4, lines 36-39).

Although Rungta does not specifically teach the step of refraining from writing data to storage blocks in response to said active map, Kuster teaches this limitation at col. 8, lines 63-64, that is, the process to block 604, where the snapshot driver 235 holds the write request". Note that Kuster discloses the snapshot driver maintaining a listing, such as the snapshot bitmap 270 of allocation units for which old data should be copied prior to being overwritten (col. 9, lines 2-5).

Since both Rungta and Kuster teach the same field as creating a snapshot of the file in the file system, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Rungta with the teachings of Kuster to include “refraining from writing data to storage blocks in response to said active map, the motivation for doing so would have been to: (a) determining whether the write request is directed to allocation units on the base volume that currently contain data of interest (i.e. original data that existed at the instant the snapshot was captured), (b) providing a system and method for creating a snapshot with a differential file maintained on the base volume that can grow as much as needed.

Thus, contrary to Applicant's argument, it is evident that claim 1 is obvious in view of Rungta and Kuster and it would have been obvious to combine Rungta into Kuster in accordance with the motivation set forth above.

### *Conclusion*

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

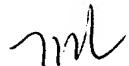
however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Miranda Le whose telephone number is (703) 305-3203. The examiner can normally be reached on Monday through Friday from 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E. Breene, can be reached on (703) 305-9790. The fax number to this Art Unit is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-3900.



Miranda Le  
March 19, 2004



GRETA ROBINSON  
PRIMARY EXAMINER